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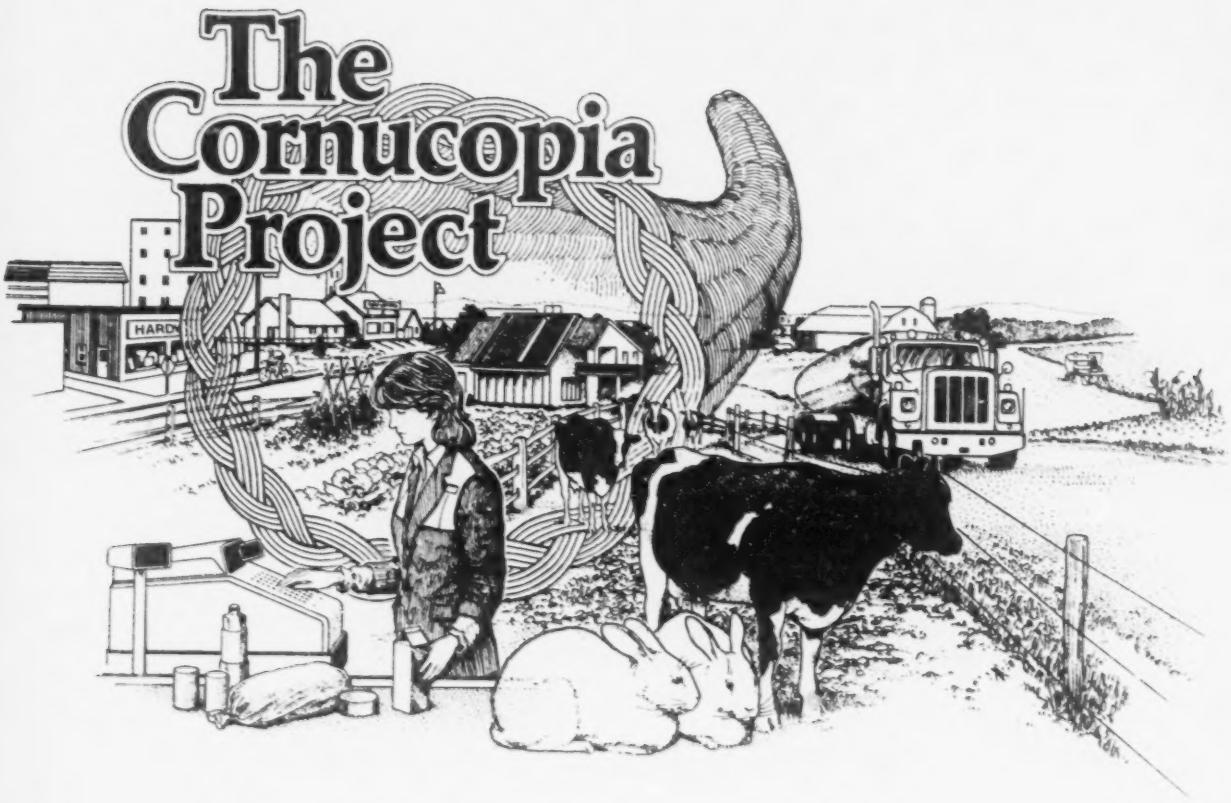

THE MAINE FOOD SYSTEM: A TIME FOR CHANGE

A study of the food system of Maine by

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Preface

This report is based on a study of the food system in Maine. The study did not merely look at agriculture, or any other particular part of the food system in isolation. Rather, it was an attempt to look at all the parts of the system, to see how they interact and work together to create the structure which provides our food.

When most of us think of food, we think of eating. This is not surprising since we are all consumers. However, the consumption of food is only one part of a large complex system. Tremendous amounts of labor, resources and technology are required to produce, process, and distribute our food. All of us are familiar with the consumption part of the food system, but most of us have little contact with the other parts, and know almost nothing about the system that feeds us. A primary aim of The Cornucopia Project is to help people look at their food system as a whole, get a clear picture of its present status, and work for constructive change.

While the concept of a food system may be new for many Maine people, the idea of self-reliance is not. There has been a great deal of speculation about the feasibility of food self-reliance for Maine. Many have dismissed the idea as being impractical and naive. However, given the findings of this study, if Maine is to have a food supply that is reliable and sustainable, increased self-reliance is both practical and necessary.

I. Introduction

When out-of-staters think of Maine, they tend to think of a place of wild and unspoiled beauty, of small towns surrounded by miles of farmland, fields and forest. They think of the rugged Maine coastline and of little fishing villages, of self-sufficiency and of Yankee ingenuity. Although these things still are important to the flavor of our state, a closer look reveals that Maine faces the same problems of urbanization, industrialization and environmental deterioration that confront other states.

Common results of industrialization are centralization and specialization along with rural decay. While movements from a rural to an urban society, from the farm to the factory and from self-sufficiency to interdependence have been seen as desirable in the past, there are a growing number of indications that we have become overly dependent upon a complex national system which in the future may not prove to be very dependable.

In particular, by specializing our own production of food and relying on a "trade" relationship with a national system, we may have weakened our state, rather than having strengthened it. Especially when future possibilities are considered, these discoveries should be of immediate concern:

* Over 70 percent of the food we eat is produced outside Maine.
* We spend over $700 million every year on food from outside the state; transportation alone costs us $56 million.
* Between 1940 and 1975, Maine lost 78 percent of its farms and over 60 percent of its farmland.
* An Army Corps of Engineers study estimated that if present practices continue, Aroostook County will lose 72 percent of its current acreage in potato production to soil erosion within the next 50 years.
* About 60 percent of Maine's agriculture production income is for animal products; we import over 90 percent of the feed grain used to raise these animals at prices that (due to transportation costs) are putting Maine farmers out of business.

In recent years, much has been said about the critical problems of Maine agriculture and of the Maine economy in general. Reports have been written and recommendations have been made. However, relatively little is being done. We may be moving in some of the right directions, but when we consider ourselves in the context of the rapidly changing global food situation, we certainly are not moving quickly enough.

The problems in Maine are very real, and they are compounded by the fact that the same problems are occurring across the country and around the world. Every day, while the U.S. population grows by 5,000, the nation loses the productive equivalent of 25 square miles of agricultural land to erosion and farmland development. In addition, repeated, heavy applications of chemicals and continuous single-cropping are destroying the fertility of our soil. The supply of fertilizer minerals is rapidly depleting.

Our entire food system is powered by non-renewable fuels. Processing, packaging and transporting food use 60 percent more energy than all the farms that produce our food.[1] Dependence on long-distance food transport makes supplies tenuous in many areas. Farm debts are at record levels and rising astronomically; they've shot up 650 percent in the last 20 years.[2] Irrigated farmlands in the West, which produce a large share of the nation's foodstuffs, are threatened by declining water tables and increasing salt build-up. Last year's drought caused major losses in our corn, soybean, sorghum and peanut crops, and more severe weather patterns are predicted for the future.

In previous times, the connections between Maine agriculture and events occurring in the rest of the world may have been slight or "uncertain" as they are described in a recent report on Maine agriculture.[3] However, such an age of isolationism has ended. Like it or not, we are living in a single global village whose survival is dependent upon the willingness of its citizens

to think in terms of the welfare of all people.

Whether or not Maine's present food system is actually detrimental to the world as a whole, our own supply of food is quite vulnerable. An energy cutback, a transportation strike, a freeze, drought or labor dispute in California -- any of these could mean a food crisis. Our method of producing food is wearing away our state's productive capabilities. In earlier times, a food system that consumed resources so heavily seemed to make sense. In today's world, it certainly does not.

But the situation is far from hopeless. Maine has the resources, both in land and people, to change this dangerous position. We can preserve our farms and farmland, increase our self-reliance, and develop a secure food supply, if we act now. The purpose of this report is to help us begin to do that.

II. The Frightening Facts

Maine's food system is in trouble. The biggest danger is that the situation may become critical before it even seems serious.

Maine people have historically taken pride in being able to take care of themselves. Living in a state that still has a relatively unspoiled environment and many unexploited natural resources gives us a feeling of security. Many of our grandparents were self-sufficient in terms of food, fuel and shelter. The recent proliferation of home gardens, woodstoves and solar heated buildings are all evidence of a continuing value in self-reliance.

In terms of food production, Maine leads the U.S. in lobster and low-bush blueberries. It ranks near the top in potatoes, fish, shellfish, broilers and eggs, and produces substantial amounts of dairy products and apples.[1]

Despite the fact that Maine is no longer a "farm state" (agriculture

is the third ranking enterprise behind paper and food processing), Maine has over 8,200 farms and about one million acres of prime cropland and pasture.[2,3] In addition, Maine has about 15,000 fishermen and over 7,000 fishing boats.[4]

Each year Maine generates over $400 million in farm receipts and over $90 million in fishery products.[5,6] Maine has 31 percent of all farmland in New England[7] and over 30 percent of the total New England fishery catch value.[4] The retail value of all food production in Maine was over $1.6 billion in 1980.[8]

Despite this abundance, in terms of necessities, our state has been dependent on outside suppliers for a long time. Only 12.3 percent of our energy and 27 percent of our food needs are produced within the state.[7,8] In order to feed us, more than 700 truckloads of food from such distant places as California, Arizona and Florida come rolling into the state each week.[9] Among these imports are nearly 100 percent of our grains, oils, shortenings, lettuce, tomatoes, turkey and hard cheeses, 96 percent of our pork and 90 percent of our beef.[8]

Since most of our food comes from far away places, that is where our food dollars go. Maine people spent over $1.0 billion for food in 1980 -- $940 for every child, woman and man in the state. Of this amount $700 million was paid for food produced outside Maine.[8] This is about $623 for every person in the state each year. About $1.5 million leaves the state <u>each day</u> to pay for our imported foodstuffs.

As we have become more dependent on other states to supply our food, we also have become more dependent on transportation and marketing systems for handling the food that is produced in the state. Since we export 83 percent of the state's agricultural and fishery products, we rely heavily on other states to consume our food.[8]

But these figures on food imports and dollar exports do not tell the whole story. Food production in Maine has suffered a long decline, further increasing our dependence on a national food system whose sustainability is being brought to question.

In the U.S. as a whole, urban sprawl and development have eaten into the farmland base. In contrast, the loss of farmland in Maine has been due to abandonment. When agriculture moved west and became increasingly mechanized, many eastern farms suddenly found themselves at an economic disadvantage. Part of the reason for this economic disadvantage is that agriculture in the west was subsidized through cheap irrigation, cheap migrant labor, low energy costs and vast sums of research money that went (and still goes) to fund agricultural research and technological innovations oriented towards large farms. In Maine, traditionally a small-farm state, the problems of climate, terrain, soils, geographical location (being at the end-of-the-line in the nation's transportation routes) and other region's subsidies, generally combine to make production costs higher and productivity lower than in other regions. Many small farms have simply folded. The remaining agriculture has become mechanized and highly specialized. Farms found they could survive only by producing large quantities of a reduced variety of crops.

Although Maine has not lost a great deal of farmland to development, its total loss of farmland has roughly paralleled that of the U.S. The number of farms in Maine has dropped sharply since 1880, the year Maine farming was at its peak. At that time our state had 6.6 million acres of farmland, 64,000 farms and over one million livestock.[10] In 1880 Maine had 4 times as much farmland, 8 times as many farms and 10 times as many livestock as it has now. In just the 25 years from 1949 to 1974, we lost 78 percent of our farms and 62 percent of our farmland.[11] If this trend

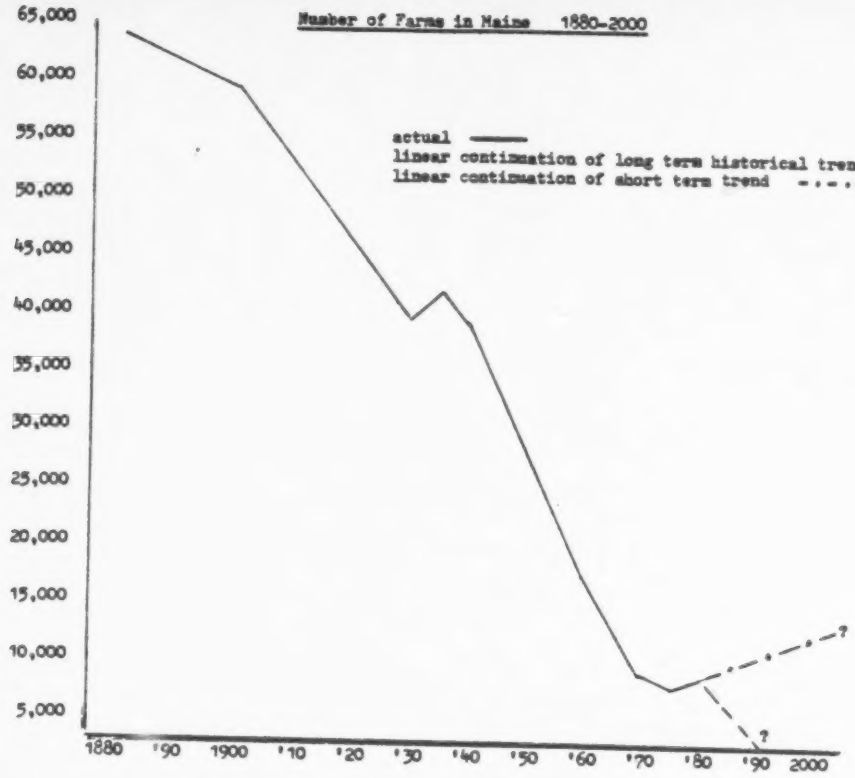


Figure 1

Source: Census of Agriculture, U.S. Department of Agriculture

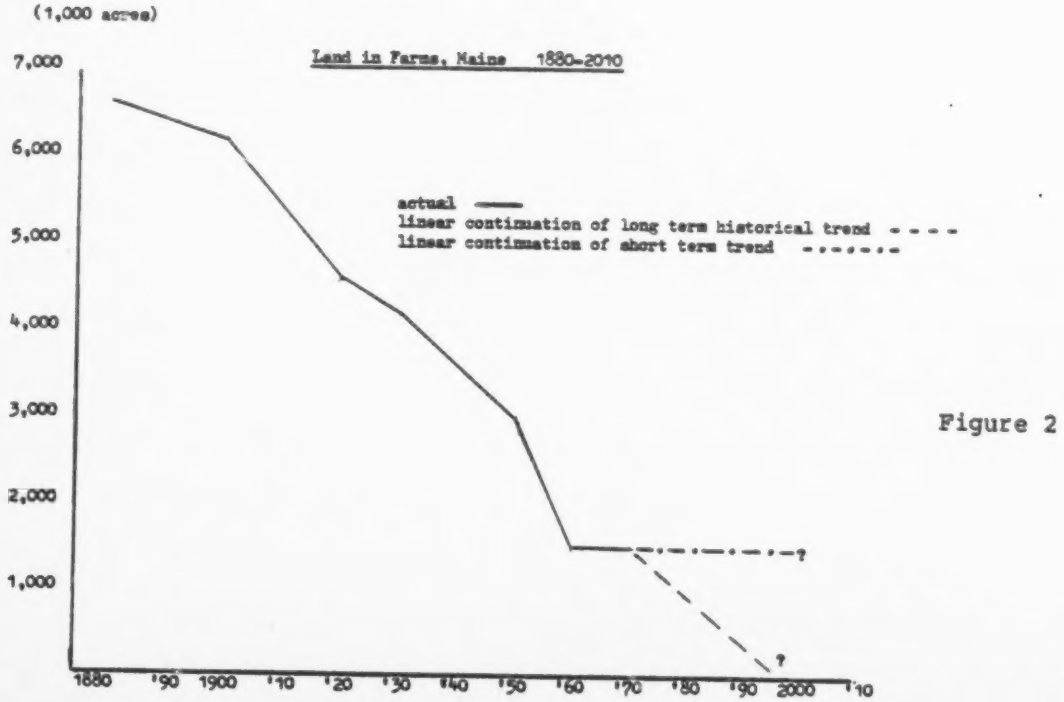


Figure 2

Sources: U.S. Department of Agriculture, Census of Agriculture

were to continue, our grandchildren would never know what a farm looks like.

Part of the reason for the decrease in the number of farms is the increase in size. Since 1880 the average farm size in Maine has grown by 225 percent.[10] The farm population in 1970 was only 17 percent of what it was in 1940.[12] This means that the power over our food system is being concentrated in fewer and fewer hands. A system dependent on large farms is less flexible or adaptable in times of stress than one composed of many small farms. And for some crops, large farms are less efficient than smaller ones.[13]

Erosion can be both a cause and an effect of agricultural decline. Intensified by the fierce competitive pressures facing Maine farmers, erosion has been highly destructive to farmland here. Our croplands annually lose 2.7 million tons of soil to sheet and rill erosion[14] -- enough to cover one lane the entire length of Interstate 95, from Kittery to Houlton, with over 3 feet of soil.[15] The loss of soil is worst in Aroostook County which has 82 percent of the state's tilled cropland. The annual loss there of six to nine tons per acre is two to three times the rate acceptable by USDA criteria.[16] The erosion in many fields is so serious that the Commission on Maine's Future concluded: "Erosion and depletion of soils is occurring so rapidly that within 25 to 50 years it may no longer be possible to grow potatoes in much of Aroostook County."[7] The Army Corps of Engineers reported that in the next 50 years, Aroostook County will lose 130,000 acres to soil erosion, 72 percent of its current acreage in potatoes, leaving only about 50,000 acres for potato production.[17]

Erosion is a "natural" process that affects nearly all soils. Intensive chemical farming, with continuous planting of row crops and use of heavy equipment that compacts the soil, increases the erosion beyond a sustainable rate. Maine's soils are relatively thin and infertile to begin with; we

cannot afford to be as "careless" as those in regions with thick topsoil.

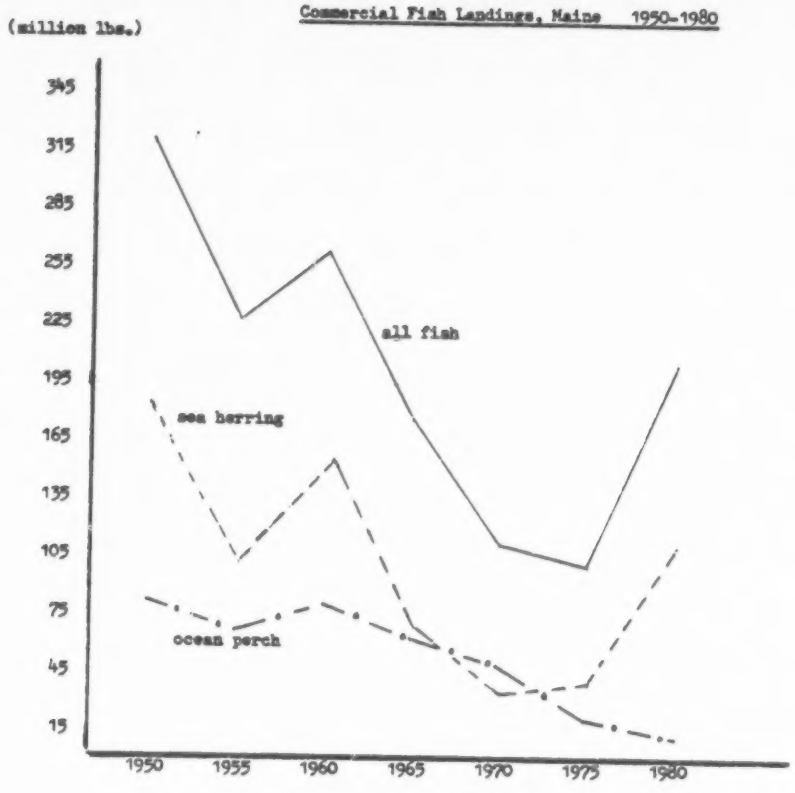
Measured in terms of acres lost, the soil eroded from croplands in Maine would come to over 2,800 acres annually.[18] Besides endangering our future, this destruction of soil exacts a heavy price in the present. Each foot of eroded soil can store about two inches of water for crops, and an acre-foot contains about 8,000 pounds of nitrogen and 2,000 pounds of phosphorus.[19] So through erosion, Maine loses about 11 million pounds of nitrogen and 2.8 million pounds of phosphorus each year. At current prices, this represents an annual loss of over $4 million in just fertilizer materials -- about 22 percent of Maine's fertilizer consumption in 1978.[20] And this does not include the value of the 77 million gallons of water storage capacity lost or the long-term decrease in the productivity of the soil.

Just as agriculture has suffered from loss of farmlands and increased energy inputs, U.S. fishery stocks have become depleted and world fisheries have suffered declining productivity. The problems of the world fisheries directly affect us because the U.S. imports about 60 percent of its fish.[21] On the national level, gradual increases in total fishery production have been attained. However, these increases have been paralleled by increased numbers of fishermen and fishing vessels.

Maine is blessed with over 3,500 miles of coastline, bays, islands and inlets. Our state has been endowed with a rich fisheries resource. In 1980 the weight of commercial fish landings in Maine was 638 million pounds, enough to feed nearly 7 million people.[22] However, the amount of fish landed in Maine has actually declined by 31 percent since 1950.[4]

Fisheries differ from agriculture in that fish represent a "free resource"; there is no cost in raising the "crop" but only in harvesting it. Thus, a decline in fishery catch does not necessarily signify stock depletion. A decline could be the result of a reduced "fishing effort". However, there

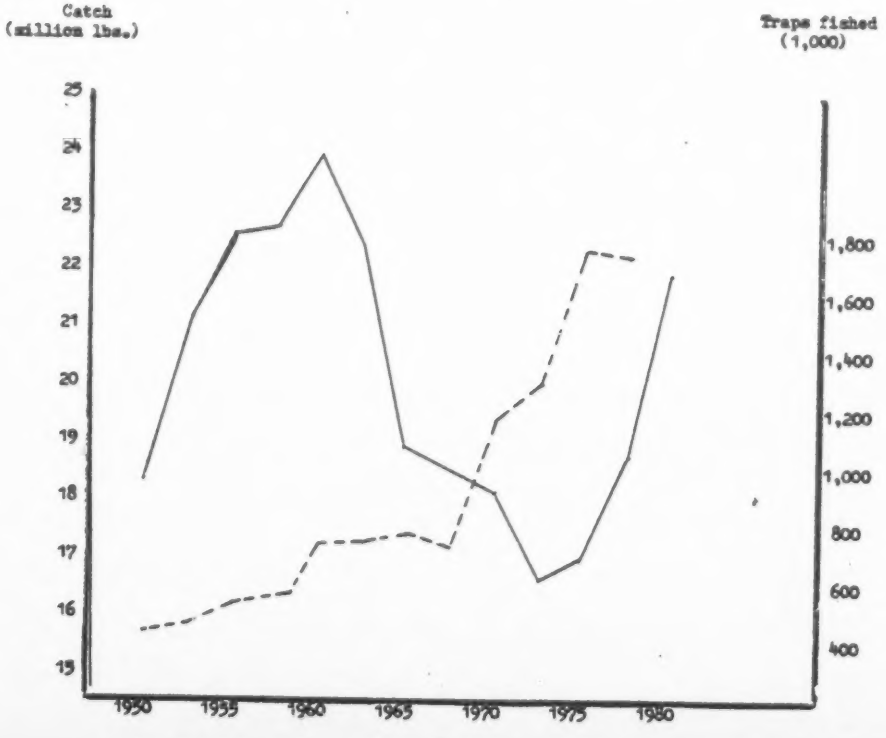
Commercial Fish Landings, Maine 1950-1980



Source: Maine Landings, Annual Summaries 1950-1980

Figure 3

Catch of Lobsters, Maine 1950-1980



Source: Maine Dept. of Marine Resources, "Fisheries Management and Completion Report"

Figure 4

are many indications that overfishing has indeed been the cause of smaller harvests. The Maine fishing industry faces diminishing returns per unit of fishing effort.

A good example is the lobster industry, presently the leading marine resource in terms of dollar value. Between 1951 and 1955 there was an average of 5,400 lobster fishermen using a total of 462,000 traps; total landings averaged 21.5 million pounds per year.[23] Since that time, the number of fishermen has increased by 80 percent and the total number of traps by 279 percent. Meanwhile the lobster catch has dropped by 16 percent. A recent Department of Maine Resources study showed that 86 percent of the legal sized lobsters are caught each year, leaving few lobsters as breeding stock. The study concluded that the failure of a single year class of lobster would directly lead to a collapse of the lobster industry for at least one year. Another example is the mussel industry. Sustainable harvest rates have been estimated to be 1.5 million pounds per year. The harvests in 1978 and 1979 were 3 million pounds each year.[23]

In addition to overfishing, water pollution threatens the fishery stocks in both marine and inland waters. In the 15 years between 1961 and 1975, there were over 465 million pollution-caused fish kills reported in the United States.[24] Since these numbers are only reported incidents, they represent only a fraction of the total loss due to water pollution. In Maine, there were 93,695 fish kills reported, most occurring in rivers. Agricultural pesticides, fertilizers and industrial operations are listed as the major sources of pollution.[24] Although relatively little is known about the extent of damage to the fisheries and the health-hazards to those who eat fish, we continue to use our waters as dumping grounds. So far we have been fortunate; we have not felt the effects a major oil spill might have on Maine fisheries and on our food supply.

In much the same way as agricultural decline, the decline of the fisheries can be traced to competitive disadvantages confronting Maine producers. In the case of the fisheries, Maine fishermen are ill-equipped and piers are inadequate. They also experience a problem common to U.S. fishermen in general; they must compete with largely government-subsidized foreign fleets. It appears that neither the farmer nor the fisherman is getting an adequate return for his or her efforts. Increasingly, it has become difficult to make a living in the business of food production. While in the past, dependence on other regions has not been considered "unhealthy", there are many reasons to feel that if Maine is to thrive in the future, we must move toward greater food self-reliance.

III. What do These Facts Mean?

This situation represents much more than some unusual numbers. Together, these numbers add up to some disturbing news for anyone in Maine who eats.

1.) Our food supply is vulnerable. Because we depend on outside producers for most of our food, our supply is highly uncertain. In addition, most of the food production that does occur in the state cannot occur without inputs of fuel, fertilizers and feed grains, all from outside sources. An oil embargo or energy shortage, a labor dispute, a drought or a crop failure in the midwest or California -- any of these -- alone or in combination -- could lead to serious shortages of foods which Maine now imports while at the same time hobbling our existing food production systems. A California Department of Agriculture study indicated that "California's enviable position in agricultural productivity has been built upon relatively inexpensive energy inputs and available supplies", and that "most of California's best farmland lies within counties designated as Standard Metropolitan Statistical Areas".[25] The radically changed world of expensive energy, the loss of farmland to development, and California's increasing population, could lead

to a situation around the year 2000 where California has little or no food to export. Thus, any notion that development of farmland is a problem that "doesn't affect Maine" is only false security. Loss of farmland in other states directly affects us, because it directly affects our food supply. We must have food to live, and we currently get most of it from sources which we do not control.

If any disruption in our food supply occurred, perishables would disappear from the stores almost immediately.[26] With normal buying patterns, stores over 10,000 square feet might have canned goods for as long as a week; smaller stores without storage space would empty sooner. If, however, people knew that a food shortage was likely, a "food panic" probably would empty all the stores in less than a day.

Such scenarios are not mere fantasy; we've already had a taste of what they might be like. During the last oil shortage, a study showed that in Pennsylvania, grocery warehouses were out of almost 20 percent of all food items.[26] Being situated at the end of the nation's oil pipelines and transportation systems plus having a wholesale distribution system dominated by one major wholesaler makes Maine even more vulnerable to disruption of supply. Perhaps we could subsist for a while on in-state production of surplus fish, potatoes, poultry, eggs, milk, apples and blueberries, but even these commodities could not be produced by our present system if our supply of inputs were cut off. Our addiction to these inputs is costly. For example, we import over $260 million worth of livestock feed, over $26 million in fertilizers and our farms spend $43 million for fuel and electricity each year.[20] Fishing, especially off-shore trawling, is an energy intensive activity requiring approximately ten calories of fossil fuel energy to produce one calorie of food protein.[27] It could not continue if fuel supplies were cut off.

2.) Our food is more expensive and less tasty. Partly due to added transportation distances, the Maine food bill is more than 10 percent higher than the national average.[28] This figure is substantial, especially when you consider that the per capita income is only 81 percent of the national average.[7] The practice of importing most of our food is a costly one; the bill comes to over $56 million a year for transportation. We pay $5 million just to bring in our fresh vegetables.[29] Another $3 million worth of fresh vegetables is "lost" to spoilage during long-distance transport.[30] Over $153,000 per day is paid by Maine consumers for transportation costs alone.

High transportation costs affect producers as well. The poultry industry (broilers and eggs) accounts for about 40 percent of the state's farm income.* Feed (mostly corn and soy meal) is the major cost involved in raising poultry. In order to feed our poultry, we import about one million tons of grain from the midwest each year; this amounts to 97 percent of the amount consumed.[16] We grow only three percent of the grain we need, shipping the rest in by rail from the midwest, despite the fact that transportation costs here are higher than in any other poultry producing area in the country.[31] Not only are distances greater, but the rates per ton-mile for rail car shipments to Maine are higher than in other areas.[31] These factors result in an added cost of $50.00 per ton in the price of grain over that paid by farmers in the South.[32] Similarly, the production of potatoes in this state has been an example of "input agriculture". In the case of potatoes, fertilizers are the costly import, representing 14 percent of production expenses.[33] Faced with declining productivity due to decades of intensive cultivation,

*As this study goes into print, the Maine broiler industry is in a state of almost total collapse. The demise of the industry is being blamed on economic difficulties stemming from poor management, unfavorable government policies and overproduction.

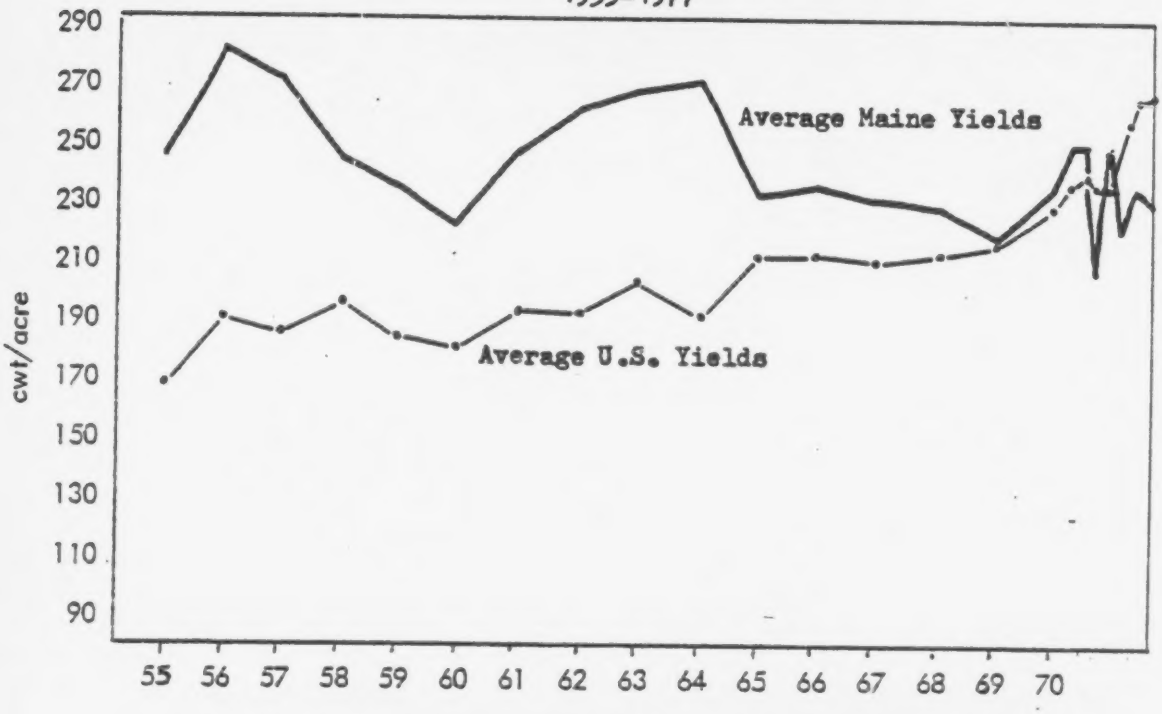
soil compaction and erosion, farmers have relied more and more on these imported nutrients in "feeding" their potato crops. The condition of our soils makes our producers more dependent on fertilizers than those in other potato-producing areas. Given present production techniques, without the use of fertilizers, potato yields in Maine would probably drop from 25,000 to 7,000 pounds per acre.[34] Even with increased use of fertilizers, Maine potato farmers have experienced decreases in yields. While yields in Maine have fallen, yields per acre elsewhere have increased, leaving Maine at a competitive disadvantage to producing areas in other states (See Figure 5).

In addition to being expensive, transportation has been unreliable. The poultry industry lives in constant fear of a disruption of grain supply (storage facilities give us only a three to five day supply should rail shipments be halted). The potato industry also found the railroads to be unreliable for shipping potatoes to northeastern markets. However, they have yet to find a satisfactory solution. In 1978, the potato industry reported having trucking shortages 55 percent of the time.[31]

The future of Maine's primary products, poultry and potatoes, which together account for 72 percent of the state's agricultural income,[31] is quite gloomy. Under the current system, the essential nutrients required by both these industries are imported. The farm serves merely as a "mixing bowl" for a number of ingredients that are shipped in separately and then transported out as a finished product. As transportation costs rise, this inefficient way of using Maine as a mixing bowl will make less and less sense. In the future, the mixing will take place either where the ingredients are produced or where they are consumed.

Even if we found other producing areas, other markets and transportation linkages to be reliable, there are additional factors to consider. Food that travels cross-country generally suffers in nutritional value and in

The Decrease in Relative Productivity of Maine Potato Farms:
Average Potato Yields for Maine and the U.S.
1955-1977



reprinted from: Maine State Planning Office, Agriculture in Maine: A Policy Report," second printing;(Augusta, Maine March 1979) p. 11

Figure 5

flavor, because it must be picked before it is fully ripe. In short, we end up paying more for food of lesser quality, while simultaneously discouraging local production and hurting the Maine economy.

3.) Our local economy is weakened. Keeping more of our food dollars here would strengthen Maine. An economically healthy fishing or farming sector increases the strength of the whole region.

A study in Pennsylvania found that every dollar spent by a farmer generates $2.20 in local business.[35] If instead of sending $525 million (approximately 25 percent of the total $700 million goes to retailers and to transportation costs) to agribusiness in California and Florida, we sent out money to Maine farmers, it would be spent locally and put in local banks. So if, for example, we produced all our food within the state, an additional $1.16 billion worth of local business might be generated.

Maine is a relatively poor state, and some economists believe that it is the poorest state in the union when the cost of living is added in.[36] It may not be just a coincidence that Maine is probably one of the most "dependent" states in terms of food and energy. While we import 90 percent of our energy and 70 percent of our food, we export 70 percent of all products produced in the state.[7] In addition, little of this investment in transportation is benefiting Maine since 90 percent of all truckers hauling Maine agriculture products are based out of state.[16]

One does not need to be an expert in economics to recognize that these facts are major sources of our state's economic difficulties. And looking at these facts alone, one would wonder if Maine has grown past its infancy stage of being a colony of Massachusetts. These facts are perhaps only part of a larger picture in which economic opportunists on the outside have "used" our state as a source of raw materials and cheap labor. In recent years control by outside interests has increased rather than declined.

Traditional Maine businesses such as Decoster Egg Farms, Burnham and Morrill Company (B & M Baked Beans), Snow's Food Products (clam chowder), G. H. Bass Company (shoes), Oxford Paper and Bath Iron Works have been purchased by multi-national corporations.[36]

In trying to measure the real efficiency of such a system, one does not need to look past the plight of the small farmer or the small fisherman in Maine. In 1977 the per capita income in Maine was $5,098, only 81 percent of the national average. In that year, 35 percent of all Maine households had an income of less than $10,000. These figures which are lower than the national average, are even lower in fishing and farming sectors of the state. The Food and Farmland Study Commission found that in Maine those classified as small farms (gross income under $20,000) had an average net income from farming at the poverty level. Most Maine farmers are listed as part-time farmers who must supplement their income with other jobs. Aroostook County, the biggest farming region in the state, has not found agriculture to be particularly profitable: The 1977 per capita income there was substantially lower than the state average at $4,692. This region also experiences the highest unemployment rate (9.5 percent) and was the only county to experience net emigration (2,345 people) between 1970 and 1977.[37] The fishing industry is spread along the coastal counties which also do a good portion of the manufacturing in the state so meaningful figures are difficult to gather. However, unemployment has been a chronic problem among fishermen also.

IV. What Can We Do?

The trends of declining productivity and increasing dependence outlined in this report do present a gloomy picture -- one that should be of concern to all of us. However, there is an increasing amount of evidence to show that Maine food production may be at a turning point, that the trends are

reversing and that we may have begun moving toward new ideals of sustainability and self-reliance. These good beginnings should give us hope, but if Maine is to transform its food system into an economically healthy and sustainable one, much effort and perseverence will be required.

It should be noted that although Maine has not lost as much acreage in farmland to development as many other states (Maine was among the five states that suffered the smallest loss of agricultural land from 1967-1977),[38] we have a comparatively small farmland resource base to begin with. Only nine states have a smaller cropland base.[39] Maine was also listed among the five states with the lowest percentage of land having potential for future conversion to cropland use.[38]

Since 1974, Maine has experienced an increase in number of farms and in farmland. This is an exceptional development since the U.S. as a whole has lost farms and farmland. The estimated number of farms has risen from 6,436 in 1974 to 8,300 in 1981,[2] many of these being small and part-time farms. At the same time total farmland in the state has increased from 1,523,696 to 1,615,000 acres.[40] There has been a recent resurgence in fresh vegetable and sheep farming. Many of the additional farms are the work of new immigrants to Maine. These people are generally young, highly educated, and come with an interest in resurrecting traditional values and activities.[7]

The fisheries also exhibit signs of revival. Since 1976, fin fish stocks off the coast of Maine have increased dramatically. While commercial fishery landings in Maine had steadily declined from 1950 to 1975, landings have increased from 100 million pounds in 1975 to 207 million pounds in 1980. These figures, however, are still somewhat below 1950 totals of 322 million pounds and do not include shellfish landings which have remained relatively steady throughout the period.[41]

It does look like Maine is already moving in some of the right directions

towards a sustainable food system. However, before speculating on the extent to which Maine might become self-reliant, it is important to recognize that there are some important limitations to diversification of production in Maine. To begin with, Mainers must contend with a short growing season ranging from about 120 to 140 days. The cold climate combined with the problems of our soils, which are generally highly acidic and rocky, together with the problems of our terrain, which is generally irregular and poorly drained, have discouraged large-scale farming in the past. Due to climate, soils, and topography, there are a number of crops not suitable for growth in Maine using conventional agricultural techniques. However, Maine certainly could produce a larger quantity and a wider variety of food crops. A good place to begin might be with vegetables.

In Maine, we currently import over 80 percent of our vegetables.[8] To produce all our vegetables within the state would require about 32,000 acres -- 3.5 percent of our total cropland. The idea that Maine could grow more vegetables is not a hypothetical one -- in 1950 acreage in vegetable production was more than double the current acreage. Although not all crops can be grown in Maine, we could provide for most of our current vegetable consumption, and with some changes in diet could be totally self-reliant.

Changes in our diet would not have to be major ones. Using such methods as indoor propagation and transplanting, we could have a fresh supply of most vegetables for 4 to 6 months. Some crops -- including potatoes, carrots, onions, beets, cabbage, turnips and winter squash -- keep well in cold storage and could be available in their fresh form nearly all year. (See figure 6). Our existing 700 greenhouses could produce part of our out-of-season vegetable needs. And since 35 percent of our present vegetable consumption is either in the form of frozen (12 percent) or canned (23 percent) vegetables, we could grow and preserve much of these in Maine.

VEGETABLES FOR STORAGE

Beets. Pick mature vegetables before first killing frost. Pack in layers of damp sawdust or sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Brussels sprouts. Harvest after a few mild frosts. Store in perforated plastic bags. Requirements: 32 to 40° F., 90 to 95 percent humidity. Life: 3 to 5 weeks.

Cabbage. Pick firm, solid heads, and trim off loose outer leaves. Place heads on shelves, string them up by the roots, or wrap in newspaper and store in boxes or bins. (Beware: cabbage emits a strong odor during storage.) Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 2 to 4 months.

Cabbage, Chinese. Store only mature, solid heads, picked before a severe frost. Store as with regular cabbage, or pack roots in damp soil or sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Carrots. Dig before any hard freezes. Store in cartons of sawdust, sand, or leaves. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 6 to 8 months.

Celery. Store in trenches in the garden, or place roots in boxes of sand or soil. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Endive, escarole. Pick after moderate fall frosts. Store with roots in soil or sand. Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 2 to 3 months.

Garlic. After curing, store in paper bags, or braid into strings and hang from rafters. Requirements: 35 to 40°F., 60 to 70 percent humidity. Life: 6 to 8 months.

Horseradish. Dig anytime in fall. Store in damp sand or sawdust. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Jerusalem artichokes. Mulch in garden or store in plastic bags or damp sand. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Kohlrabi. Remove leaves and roots. Store in damp sand or sawdust. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 3 months.

Onions. After curing, remove tops and store in bins or string bags, or braid and hang from rafters. Requirements: 35 to 40°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Parsnips. Mulch in ground or store in damp sawdust, sand, or leaves. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 4 to 6 months.

Potatoes, sweet. After curing, wrap individually in newspaper and pack in baskets, or pack loosely (make sure potatoes aren't touching) in cartons of sawdust. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 3 to 5 months.

Potatoes, white. Late potatoes store best. After curing, pack in baskets or boxes. Don't store near apples, which give off a gas that promotes sprouting. Requirements: 32 to 40°F., 80 to 90 percent humidity. Life: 4 to 6 months.

Pumpkins. After curing, place on shelves or in boxes. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Rutabagas. Dig after a few mild frosts. Store in damp sand, sawdust, or moss. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Salsify. Mulch in garden, or store like parsnips. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 1 to 2 months.

Squash, winter. After curing, pack on shelves or in boxes. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 months.

Tomatoes, green. Pick mature green fruits before frost. They will gradually ripen at 55 to 70°F. Requirements: 50 to 60°F., 60 to 70 percent humidity. Life: 4 to 6 weeks.

Turnips. Harvest before a heavy freeze. Store like carrots. Requirements: 32 to 40°F., 90 to 95 percent humidity. Life: 2 to 4 months.

Figure 6

Before Maine farmers diversify their production, they will want to be assured of selling their produce at a fair profit. Consumer demand for locally-grown fresh produce may already far exceed current supply. At this point, more than anything, we need a marketing system in which the farmer can be sure of selling for a fair profit and in which the consumer can be assured of a reliable supply.

The evidence is clear that programs for growing and marketing produce locally benefit both the farmer and the consumer. The food is tastier and fresher and far less energy is consumed in getting it to the table. A United States Department of Agriculture study of direct markets in Colorado showed that local farmers received 44 percent higher gross returns than if they had sold through wholesale channels, while consumers got an average 28 percent discount compared to supermarket prices.[42] A New York City study showed that for consumers, price savings ranged from 7 to 35 percent.

Another approach to increasing our self-reliance is expanding the role of home gardens. Approximately 50 percent of the households in Maine currently have gardens, with the average size being 1,000 square feet.[16] This amounts to 4,200 acres of home vegetable production with an estimated annual value of over $8 million. If each of these 185,000 gardens produced 1,380 pounds of vegetables, they could provide <u>all</u> of Maine's vegetable needs (fresh, canned, and frozen). If each present gardener produced 884 pounds of vegetables, all of Maine's <u>fresh</u> vegetable needs could be provided. (These are not outrageous figures; many gardens produce more than this.) Or if all Maine's households had gardens that produced 690 pounds of food (the average U.S. garden in 1979 produced 545 pounds but was 33 percent smaller than the average Maine garden),[43,16] all the state's vegetable needs would be met. This won't happen, of course, but it helps show the significant contribution home gardens already make to the state's food supply, self-

reliance and economy, and that there are even greater possibilities.

Another potential food source that can be directly tapped by the consumer is the abundant "wild food" resource in the state. Over 3.5 million pounds of venison and moose meat (dressed weight) were harvested by hunters in 1979.[44] Deer and moose harvests together accounted for more meat than either pork, veal or mutton produced in the state. In addition, there are game birds, fish, maple syrup, wild berries, fiddleheads, mushrooms, dandelion greens and other wild edibles available for the taking. Together, these represent a substantial contribution to our state food supply. They should be recognized as food sources and perhaps protected to ensure they remain as such.

An area in which Maine is almost being forced to become more self-reliant is its grain supply. We presently import nearly 100 percent of the grains used to feed livestock and humans in the state. The survival of our poultry industry depends upon finding reliable and economical sources of grain. With rising transportation costs and an expanding world population, the outlook is not good for finding such a source. There are, however, some alternatives.

Two ways that Maine could become more self-reliant are (1) by producing more grain or (2) by consuming less. In recent years, Maine farmers have increased acreage planted in corn and oats. However, the potential for grain production in Maine may be somewhat limited. Conventional methods require large inputs of fertilizers and pesticides. The relatively poor soils in Maine require larger fertilizer inputs than soils in the midwest to produce the same grain yield; thus large-scale grain-raising has not been economical here. And unless farming methods shift from chemical to biological agriculture, grain-raising would not represent increased self reliance; it would only cause our dependence to be shifted from grain inputs

to chemical inputs. Although we probably will never produce grain at the rate we import it now, there is potential for some expansion. A likely niche for grain-raising might be as a rotation crop with potatoes. By rotating oats, wheat, buckwheat and legumes with potatoes we could increase our self-reliance and at the same time improve our soil, instead of losing it.

Much of the land in Maine is more suitable for growing hay or for pasture than for growing vegetables or grains. Maine can produce more protein per acre in grass than Iowa can produce in corn.[31] If Maine agriculture is to expand, we might be wise to increase our production of livestock that can subsist on these native feeds. Sheep and cattle can be raised almost entirely on grass and a large market already exists since we now import nearly 90 percent of our beef and lamb. It should be noted that range-fed beef is more efficient but a different tasting source of protein than the grain-fed beef currently raised in midwestern cattle lots. Although present grading standards and eating habits favor fattened feedlot beef, a strong case can be made for the health benefits of switching to range-fed beef. Maine could take a leading role in the Northeast in producing grass-fed livestock and promoting the nutritional, ecological and economic advantages of these products.

Our commercial fishery is another area in which we could benefit from some changes. Maine people consume less than 10 percent of the fish and shellfish landed in Maine, yet few of us are complaining of having too much seafood in our diets. Fish is expensive and except in coastal areas, difficult to obtain. That's no wonder, since much of our supply is shipped to Boston or Gloucester to be filleted and then returned to Maine for sale! Maine is gifted with an abundant fisheries resource; but before these resources can be utilized, we need to have well-equipped fishermen, fish-processing

facilities and in-state marketing system. The fish stocks exist now. However, due to economic hardships, Maine fishermen generally lack adequate gear, boats and piers. There is relatively little fish-processing done in the state. If our fishing industry is to by stimulated, we must provide financial incentives to get it moving.

Another means of decreasing our food imports is by reducing the amounts of food and other organic materials that are lost as waste in our current food system. Just as conservation is a source of energy, it can be a source of food. About 20% of all food produced in this country is "lost" or "wasted", 39 percent of this amount occurs in the home.[45] Approximately 10 percent of all food bought by consumers is thrown out as garbage.[30] If we could eliminate food thrown out, we could maintain our present diet but save over 200 million pounds of food.

Losses occur at each stage of our food system: harvesting, transporting, storing, processing, wholesaling, retailing and in home preparation. The more a product is processed, the larger the percentage of loss. To deliver fresh potatoes, post harvest handling, storage and transportation result in a 10 percent loss. When potatoes are processed, the total loss can amount to 60 percent.[30] Higher food prices will certainly cause us to be more concerned about food that is lost. Higher prices will mandate the development of a more efficient distribution system. In general, the fewer stages in the system, the closer the place of production is to the place of consumption and the closer the finished product is to its natural state, the smaller the percentage of food that is wasted. Thus, in terms of food-use efficiency, the best food system is one in which the consumer is also the producer and the distance transported is no further than from the back-yard to the supper table.

Some of the food that is discarded is not considered "fit" for human

consumption (as economics change, we may become less demanding). However, given present eating habits, much of this food could be recycled back into the food system. For example, table scraps can be fed to hogs; in Maine, potato processing residues can be used as a livestock feed.

Since the processing of food generally causes a loss in mass and in nutritional value, rising food prices could make it prohibitive to process any of our potato crop. However, in the present system, approximately 25 percent of Maine potatoes are used for processing purposes.[16] Each year, our potato processing plants generate 312,000 tons of processing waste residues.[46] A good portion of these residues, which amount to the equivalent of 19,746 tons of dry matter or about $3 million in feed grain is dehydrated for use as cattle feed.[47] Much of the feed, however, is exported.

Unless they are dehydrated at a special processing plant, potato residues do have a limitation in their use for feed. The large bulk of such residues makes them an economical feed only if they can be utilized near the site at which they are produced. This limitation points to the desirability of a more integrated (less specialized) food production system in which livestock would be raised near the site of crop production and processing.

This sort of integration also would be beneficial to the large-scale implementation of another means of reducing waste in our food system. Maine livestock and poultry produce 850 million pounds (dry weight) of manure each year.[48] Little of this is used as fertilizer. Yet in 1979 we used 110,028 tons of chemical fertilizer, much of it from Florida, New Mexico and Canada.[1] Thus, utilization of manures (both animal and human) represents a readily available way of increasing self-reliance. However, like potato residues, manures are bulky. At 1978 fertilizer prices they were economical only if transported less than three miles.[31] Use of manures rather than chemical fertilizers also involves increased labor and application costs.

Still, the economies of biological farming are changing and each year the livestock, poultry and humans in Maine do produce 78 percent of the nitrogen, 59 percent of the phosphates and 57 percent of the potash fertilizer presently required by Maine agriculture.[49] This is equivalent to more than $3 million worth of chemical fertilizer.[50] Much of this could be converted into usable commercial products.

Could Maine have a totally self-sufficient food system? Not with our present diet. We cannot grow such things as oranges, bananas, rice, sugar cane, peanuts, coffee, tea and cocoa. Our current acreages of crop and pastureland are not sufficient to produce both the meat and food crops we eat. And it is questionable whether complete self-sufficiency is a worthwhile goal in itself. Perhaps moves to increase self-sufficiency should be based on the goals of reducing food costs, averting the risk of supply unavailability when that is unacceptable, and increasing the viability of the Maine economy.

But given the vulnerability of our food supply, the growing global demand for food, and the economic and nutritional advantages of eating locally produced food, it is clearly desirable for Maine to increase its self-reliance. Likewise, individuals and regions throughout the world will find it beneficial to move toward self-reliance in terms of food. It would not be difficult for us to produce substantially more of our vegetables and range-fed livestock and to increase our production of grains, fruits and legumes while at the same time decreasing our dependence on imported agricultural inputs.

With the continuation of certain trends of change in our food consumption patterns we could greatly increase our self-reliance. For example, annual beef consumption has dropped in recent years (it was 98 pounds per person in 1976 and 80 pounds per person in 1979).[51] It is not hard to see

why beef is so expensive -- given that we import about 90 percent of it, and that current beef production is very energy intensive. What other foodstuffs will follow in the economic footsteps of beef? What other foodstuffs will Mainers no longer be able to afford to import?

There are a number of alternatives to continuing our expensive addiction to imported beef, pork and mutton. One option is to expand our production of sheep and cattle which can thrive on locally produced feeds and pasture. This would enable us to switch our consumption of inefficient feedlot beef to range-fed livestock. Orienting our diet toward foods that are currently produced in Maine is another alternative. By substituting fish and shellfish for beef and pork, we could decrease our imports and probably become healthier at the same time. Fish is plentiful (Maine fishermen landed 217 pounds of fish and shellfish for each state resident last year) as well as nutritious, generally containing more protein per calorie than beef or pork. There are other substitutions that we might make. We could replace a good portion of our exotic imports with such locally produced staples as chicken, eggs, potatoes, apples and blueberries and not necessarily lose in nutrition or taste appeal.

Some of us have developed psychological needs for certain foods. For example, we feel we must drink orange juice to get enough vitamin C. However, many other foods have the same nutrient. Two potatoes have as much vitamin C as one orange. The total vitamin C content in commercially grown Maine blueberries is equivalent to that in 21,526,000 Florida oranges. Many of us would enjoy spooning up a bowl of blueberries instead of having a glass of orange juice for breakfast. Yet, every year we export 20,000,000 pounds of blueberries and import 26,000,000 pounds of oranges and orange juice.[8]

Even with our present diet, we can move much closer to self-reliance. To meet all our food needs, with the exception of the items that cannot

be grown here, would take approximately 1.9 million acres.[8] We presently have 1.6 million acres of farmland, with 55 percent of that amount being cropland. In order to produce virtually all of our grains, legumes, vegetables, non-citrus fruits and sugar, we would only need 17 percent of our cropland (154,000 acres). If we grew all of these foods in the state, we would still have 753,000 acres of cropland and 249,000 acres of pasture left for livestock production! However, this remaining acreage would not be sufficient to raise all the livestock and animal products we presently consume. Just to raise all our beef locally would require 545,000 acres. 753,000 acres would be enough to provide our present consumption of pork, lamb, poultry, eggs and dairy products. If all Maine farmland was used to produce products for in-state use (rather than export), we could reduce our imports to less than 45 percent.

There probably is no single ideal strategy for the utilization of Maine farmland. Changing production costs and consumption trends make the ideal strategy a constantly changing one. One must be cautious in making generalizations about optimal land use. For example, while studies have shown that it takes ten times more space to produce a pound of beef than to produce a pound of chicken, if a particular farm has only pastureland, it might be more efficient (and better for the soil) to produce grass-fed livestock than to produce corn for poultry feed.

There will always be foods that are not produced in Maine. However, many of these foods could be efficiently grown in other states in the Northeast. In addition, Maine probably will always find that it can easily produce surpluses of several foods. We currently produce large amounts of fish, potatoes, poultry, eggs, and apples which are distributed throughout the Northeast. Many of the Northeastern states have larger populations in proportion to farmland; they will find it more difficult to become self-

reliant. These factors all point to the desirability of a regional food system and of greater regional self-reliance. We may find it in the best interest of the state and of the Northeast to become a regional supplier of a few goods. In return, we might rely on areas in the Northeast for commodities less suitable for Maine climate and soils. Whatever system we do develop, we need to carefully weigh differences in production efficiency between regions with transportation costs and with considerations for long-range efficiency in terms of our economy and our environment.

RECOMMENDATIONS FOR CHANGE

What can we do in order to bring about a transition to a more sustainable, self-reliant food system with its accompanying economic and nutritional benefits? There is no single, simple answer to this immense, complex question. Because the Maine food system is touched by everything from the California food producer, fast-food restaurant, grocery store, food broker and warehouser to the backyard garden and family dinner table and is affected by everything from federal, state and city government policies to business decisions to neighborhood and consumer organizations to individual actions, any thoughtful response has to be on a variety of different levels. There are responses that are appropriate for government decision-makers, and there are other responses needed from business, from the community, and from individuals.

It is not feasible in this report to trace out all our possible options. What is feasible though, is to point out that: 1) a state plan for our food system is sorely needed which would enable us to increase our self-reliance and economic viability while also decreasing the potential for disruption; and 2) an emergency state plan for feeding Maine people during a supply disruption is crucial and given the current state of international affairs, national economy and state vulnerability, not to formulate one soon would be irresponsible; and 3) the Maine consumer can take a more

active role in his or her own food system that will make our food system more economical.

This report concludes with The Cornucopia Project's recommendations in these three areas.

1. State plan for Maine's food system:

A state food plan for Maine needs to incorporate measures which will realize the following broad policy objectives.

A. INVENTORY, MAP AND PROTECT ALL REMAINING PRIME FARMLAND FROM DEVELOPMENT AND SPECULATION.

The soil conservation service is in the process of publishing prime farmland maps for the state. These maps will be used by a Maine Department of Agriculture task force to recommend legislation to protect farmlands. An inventory of farmlands would ideally include identification of all agricultural lands, their potential, their current status and their likely availability for new farmers or farming ventures.

Preserving our remaining prime farmland by protecting it from development and speculation can and perhaps needs to involve a myriad of state and local policies that cover a spectrum of tax incentives and penalties, inheritance laws and local ordinances.

The Cornucopia Project has an ongoing task force engaged in making a comprehensive inventory of programs that other states, countries or research organizations have either instituted or proposed to deal with similar problems. This listing of options will be sent to anyone wishing a copy. One option that could be used in Maine is currently used in France, where owners of farmland within designated districts must, by law, notify a state-chartered non-profit corporation of their intention to sell their land. The corporation has the right to buy the farmland within 30 days. Capitalized by the government, these corporations function as revolving funds, reselling the land

to farmers who will commit their land to commercial farming. Essentially, the state has "first refusal" rights to all agricultural land sold. Other strategies include tax changes that modify tax assessments of farmland to reflect current use value, the institution of capital gains tax on land sales and speculation, the establishment of a "circuit breaker" tax which allows farmers to reduce their total tax load when property taxes exceed a certain percentage of their total income (with farmers signing a contract that assures that their land use does not change), the establishment of property tax at the time of sale of farmland that will stay the same until the property is sold again, and the institution of a heavy tax on profits made on the development of previously agricultural land. Yet other options include state or municipality purchase of development rights from farmers (along with the resale or lease with restrictions on use), the establishment of a development permit system, tax incentives for farmland owners to voluntarily restrict development of their prime agricultural lands, state imposed agricultural zoning, voluntary agricultural districting (in use in New York) which provides substantial benefits to farmers, including freedom from being assessed for special services such as water, sewage, drainage, sanitary landfill, etc. and the "right-to-farm" principle, which provides that municipal ordinances may not prohibit normal farming practices. Additional options include the transfer of development rights, cluster development and "agricultural open space preserves" where each municipality would be required to designate an agricultural preserve within its boundaries composed of at least 70 percent of its prime farmland.

B. PRESERVE OUR SOIL BY INSTITUTING WIDESPREAD AND EFFECTIVE SOIL CONSERVATION PROGRAMS WITH STRONG INCENTIVE AND ENFORCEMENT PROVISIONS.

The options in The Cornucopia Project's overall list that could be used in Maine include tax incentives for soil conserving measures, such

as investing in minimum-tillage equipment, refraining from fall plowing and using contour plowing, "conservation achievement contracts" whereby farmers would be provided with annual payments determined by the amount of reduced erosion achieved, taxes on each ton of soil lost from agricultural land, the prohibition of all agricultural production activities which result in more than five tons of soil loss per acre per year, the linking of commodity support programs to soil conservation programs, and the linking of state purchase of farm commodities to soil conservation programs.

C. DEVELOP INCENTIVES FOR FARMERS TO PRODUCE A GREATER DIVERSITY OF CROPS FOR LOCAL CONSUMPTION.

Many exciting things are already happening in Maine food production. Much is currently being done in the area of marketing, especially direct farm marketing and the promotion of local agriculture. The Maine Department of Agriculture, which has been renamed the "Department of Agriculture, Food and Rural Resources," is encouraging farmland preservation, diversification of production and the development of marketing systems. An institutional purchases law in which in-state producers receive preference in bidding for sale of foodstuffs to state institutions has been passed. The Department of Agriculture also has a promotional program with a logo campaign ("Maine Produces") to identify Maine products and to encourage support for local growers and producers.[52] Farmer's markets and roadside stands seem to be increasing in number each year. A 1980 directory issued by the Maine Department of Agriculture listed 22 farmers markets and over 200 roadside stands in the state.[53] Efforts are being made to get more local produce into local supermarkets. Last year there was a government-funded experiment in which a group of Waldo County vegetable growers provided large quantities of vegetables to the state's major wholesaler. Despite these advances, we have a long way to go. A recent report on Maine agriculture warns us:

"If competitive market conditions and not a concerted food policy dictates where expansion occurs, it will not be surprising to find a large proportion of new production going into exports, rather than supplying local consumers."[33] These programs are good beginnings and only need to be greatly expanded and fine-tuned.

Other options and/or strategies for improving the marketing system to strengthen regional agriculture include "forward contracts," which are agreements regarding delivery and acceptance of a specified commodity at some future date. A mandatory market reporting system would provide information necessary for decision making and identification of market alternatives. Grading standards should be revised to reflect nutritional status, product end uses, maturity and eating quality, rather than external appearances. The establishment of regional warehouses and storage facilities with efficient transport systems to move goods from the farm to the distribution center could be instituted. Public funds could be used to help establish the centers which would then be self-supporting through fees paid by producers. These centers would grade, pack and distribute the output of small local producers and provide large buyers with volumes and specifications they demand.

The dairy industry already has an extensive marketing system established which makes dairying attractive to farmers since they are assured of both a market and a stable income as a result of the associated support system. Programs set up for other farm products would provide incentives for a more diversified agriculture, and would create stability for smaller-scale operations.

Other options include electronic markets which centralize price negotiation, allow for direct marketing but include the advantages of pricing accuracy normally associated with larger markets, and a forward deliverable contract market which could achieve the benefits of open market trading along with

the benefits of contracting. Exclusive agency bargaining, vertical integration through ownership, joint ventures between agricultural cooperatives and agribusiness marketing firms, marketing orders, and marketing boards are all potentially viable alternative marketing strategies as well.

Alternatives for marketing cull cows and dairy calves have also been suggested in a USDA report focused on the Northeast. These include regional auction market centers, regional electronic exchange, a combination regional market center-electronic exchange, and contract sales to packers.

Some other options that might work in Maine include tax incentives for small scale food producers (such as not taxing the first $10,000 of income from food produced for local consumption), tax incentives for local direct markets, incentives for attracting food processors to Maine who wish to reduce transportation costs by locating near a major distribution center, mandating the use of public farmlands for the production of crops for local consumption, instituting a more extensive program promoting and advertising state-grown products (to counter promotional programs out-of-state concerns), developing tax incentives for the purchase of local products by major distribution channels, assisting small growers through a state-wide marketing clearinghouse, encouraging expansion of on-farm processing, cooling and fresh packing of local food crops, and developing consumer education programs to increase consumer awareness of locally-grown produce.

D. PRESERVE AND STRENGTHEN OUR FISHERIES

There are three basic areas in which we could improve our fisheries. One area includes measures that would ensure a self-renewing fisheries resource such as stricter laws regulating dumping of pollutants in marine waters, developing statewide resource surveys for monitoring and prediction of stocks, alleviating the problem of stock depletion by regulating annual harvests according to resource surveys and developing less destructive

harvesting techniques for shellfish. Another group of options includes measures to provide the financial assistance to fishermen so that we can efficiently utilize the annual growth in fish stocks. Ways of doing this include providing funds for construction of adequate fish piers to handle larger, off-shore vessels and supporting experimentation with aquaculture projects for different species of shellfish. A third group of measures, developing a marketing system tailored to the needs of the fisherman as well as the consumer, is needed to complement previously described options. We might do this by developing fisherman-to-consumer marketing channels through dockside fish markets and public fish auctions; promoting seafoods through consumer education on purchasing, preparing and the nutritional value of specific fish and shellfish species; funding the investigation of inland market options for Maine surpluses and by providing incentives to keep local seafood processors in business and to increase the proportion of fish landings being processed and marketed within the state.

E. CONSERVE ENERGY AND NATURAL RESOURCES

Options in this area include developing incentives and methods for using local organic wastes such as leaves, brush, sewage sludge, seaweed, etc., for fertilizer, developing incentives for water conservation measures, such as investment tax credits for drip irrigation equipment and cisterns, developing incentives for increasing the production of energy from agricultural lands in ways consistent with soil and water conservation principles, providing investment credits for construction of energy conserving barns, greenhouses, fishing vessels, etc., and establishing an Agricultural Waste Council in the Maine Department of Agriculture to develop desirable legislation and other measures to facilitate the recycling of organic wastes.

F. REORIENT STATE RESEARCH TO FOCUS MORE ON SUSTAINABLE FARMING METHODS, SUSTAINABLE FISHING METHODS AND ON LOCAL FOOD PRODUCTION.

Options in this area include the granting of additional funds to Maine's land grant university or reorienting existing research funds in these directions.

G. PRESERVE AND STRENGTHEN SMALL-SCALE FOOD PRODUCTION.

Ways to do this might include providing guaranteed state loans to beginning farmers with deferred or reduced payments until five years after start-up (as is being done in Minnesota), increasing support for direct farmer-to-consumer marketing channels, providing on-farm summer work opportunities for young people interested in learning about farming, developing a rural education center such as the one recently proposed (see Maine Organic Farmer and Gardener, Feb. 1981), developing "entry packages" for new farmers that would include help in obtaining the needed quantities of land, capital, agronomic advice along with managerial/organizational assistance, and developing a consulting program using retired farmers and others who may or may not have been in agriculture (e.g. financial specialists and accountants) to provide assistance to farmers who need managerial advice beyond or different from the capabilities of the USDA service. Each of these strategies could also be used to assist beginning fishermen and to support small and part-time fishing operations in the state.

H. DEVELOP REGIONAL AND COMMUNITY FOOD PLANS.

One possibility here is to borrow a technique currently used in China, where cities are organized around their respective food systems. In this system, a city's boundaries will include enough farmland to make the city as self-sufficient as possible. If the city gets more people, it expands its jurisdiction over more surrounding farmland to make sure it can feed itself. Other options include establishing incentives for cities and neighborhood organizations to increase local food production, processing and storage centers, as well as contracting with local farmers to supply their foodstuffs (currently being done in Japan), and revising zoning ordinances to

allow more agricultural practices in residential areas. Yet another option in this area would be establishing a state or regional Food Industry Development Institute or TVA type of organization that could deal comprehensively with a region's food system.

2. Emergency State Food Plan:

An emergency state food plan for Maine needs to incorporate measures which will deal with the following contingencies:

A. A complete oil cutoff to the United States from all OPEC countries.

B. A multi-year drought in Maine's present day major food supply areas.

C. A near shutdown for one to four weeks of the U.S. trucking and rail system.

D. A widespread labor dispute in Maine's present-day major food supply centers that could cut off the flow of food into Maine.

E. An extraordinary leap in food prices so that only the wealthiest people in Maine could afford food.

Some options Maine has for dealing with such contingencies include the establishment of state or regional grain storage facilities, the encouragement of home, community and city storage of basic foodstuffs, the formation within our current Civil Defense organization of state-wide communication and coordination centers for dealing with a food emergency, and the general encouragement, expressed in all the above measures of producing more and more of Maine's food within Maine.

3. Maine Consumer Activities

There are a wide variety of options available that will help the Maine consumer deal with the increasing price of food and the vulnerability of our supply.

These options include tax and other incentives for increasing the local production of food by expanding home gardens, producing food in the winter

with small scale greenhouses or "growth frames," producing food in the winter in larger greenhouses or "sunspaces" that can be added on to existing houses, producing protein with small-scale fish, rabbit or quail-culture, increasing utilization of "wild" food resources by state residents, processing and storing more food at home and selectively buying foodstuffs in large quantities when they are in season and then preserving them, and practicing "food conservation" by utilizing all food, either for human consumption, animal consumption or compost.

Putting the most appropriate of these measures into practice would ensure us of having a more sustainable food system and a more secure food supply while at the same time greatly increasing Maine's food self-reliance and economic viability. Without changes, Maine agriculture will either continue to produce for export or fail to produce at all. Neither outcome does much for our food security. Neither outcome will ever be profitable for Maine people. On the other hand, a move toward food security and toward more regional self-reliance in food will improve the state's economic health.

The problems afflicting our food system are real, and they are growing each day. But there are solutions, and we still have the time to make changes. With careful planning and action, we can develop a system that will improve our food supply, our environment, and our economy. If Maine is truly concerned about the condition and future of its food system, then the state must be willing to spend the time and money to see this plan modified, accepted and implemented. The time to begin is now.

NOTES

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17. "Growing Potatoes II: The Soil Needs Restoration," Maine Times, 31 Oct. 1980.

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19. W.E. Larson, "Soils and Soil Conservation: The Natural Resources Base," Contribution of Science and Education Administration, Agricultural Research, North Central Region, USDA, Paper No. 11383, Scientific Journal Series. (Paper prepared for the Soil and Water Resources Research Priorities Workshop, Madison, Wisconsin, February 23-27, 1981.), p. 9.

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24. U.S., Environmental Protection Agency, Fish Kills Caused by Pollution: Fifteen Year Summary, 1961-1975, Washington, D.C.

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32. "Hillcrest Foods' Problems," Lewiston Daily Sun, 5 May 1981, p. 32.

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36. "The Acquisition Trend," Maine Times, 10 October 1980.

37. Maine State Planning Office, Socio-economic Characteristics for Maine's Counties and Regions, Special Report Series SPS-2, December 1979, pp. 61-62, 73.

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40. U.S., Department of Agriculture, "Land in Farms by States 1979-81," Economics and Statistics Service, Crop Reporting Board, 1981, p. 4.

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42. "Direct Marketing Proves its Worth," New Farm, March/April 1981, p. 51.

43. Gardens For All, National Gardening Survey, 1980-1981, The National Association for Gardening, 180 Flynn Avenue, Burlington, VT 05401, 1980.

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47. 19,746 tons x $145 per ton (1979 feed grain price) = $2,863,170.

48. Using Maine livestock populations, and manure production figures in: U.S. Department of Agriculture, Estimating U.S. Livestock and Poultry Manure and Nutrient Production, prepared for the Economics, Statistics and Cooperative Service by Donald L. Van Dyne and Conrad B. Gilbertson, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161, 1978.

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50. Using price of $110 per ton for N-P-K fertilizers and 1979 consumption rates.

51. U.S., Department of Agriculture, Food Consumption, Prices and Expenditures, Statistical Bulletin No. 656 (Washington D.C.: Government Printing Office, 1981), p. 4.

52. The Maine Department of Agriculture, Food and Rural Resources has recently issued a cookbook, Maine Produces...Prizewinning Recipes, which features Maine food-product recipes. For more information contact the Maine Dept. of Agriculture at the address given in No. 53 below.

53. Maine, Department of Agriculture, Farmer to Consumer Directory, first edition: (Augusta, Maine - 1980). The 1981 Farmer to Consumer Directory is available, free of charge, from:

    Division of Market Development
    Maine, Dept. of Agriculture, Food and Rural Resources
    Station 28
    Augusta, Maine 04333
    Phone: (207) 289-2163

MAINE FOOD IMPORTS

(As Determined By Food Production and Consumption By Weight and Retail Value)

COMMODITY	PRODUCTION		CONSUMPTION					
	Retail Weight[a] (1,000 lbs.)	Retail Value[b] ($1,000, 1980$)	Retail Weight[c] (1,000 lbs.)	Retail Value ($1,000, 1980$)	Amount Imported (% of Consumption)	Amount Exported (% of Production)	Retail Value of Imports(-)Exports(+) ($1,000)	Land Required to Produce 100% of Consumption[d] (Acres)
Meats								
Beef	9,424.78	21,922.03	89,470.4	208,108.15	89.5		186,256.79-	545,836.
Veal	1,336.20	4,005.93	1,798.4	5,391.60	25.7		25,434.77-	5,000.
Lamb & Mutton	175.58	457.75	1,461.2	3,593.09	87.7		3,151.14-	12,900.
Pork	2,516.80	3,430.40	72,610.4	98,967.98	96.5		95,504.10-	101,700.
Dairy Products								
Fluid Milk, Cream	510,400.0	122,496.0	331,074.2	79,457.81		35.1	43,038.19+	294,700.
Condensed Milk	0.	0.	4,833.2	3,141.58	100.0		3,141.58-	21,800.
Dry Milk	0.	0.	7,980.4	12,289.82	100.0		12,289.82-	54,000.
Cheese	18,000.0[e]	18,360.0	24,952.8	41,172.12	27.9		22,812.12-	139,900.
Ice Cream	29,576.0	22,182.0	21,131.2	15,848.40		28.5	6,344.05+	48,200.
ALL DAIRY PRODUCTS (fluid wt.)	638,000.0	163,038.0	953,725.24	151,909.73	33.1		11,138.72	558,600.
Poultry & Products								
Chicken	265,555.44	180,577.70	57,886.0	39,362.48		78.2	141,215.22+	162,000.
Turkey	27.52	27.96	11,352.4	11,534.04	99.7		11,506.04-	57,900.
Eggs	251,985.0	158,750.55	40,239.2	25,350.70		84.0	133,399.85+	92,500.
Fish (live weight)								
Lobster	21,981.0	91,001.34[g]	NC					
Scallop	3,233.0	21,790.42	NC					
Clams	5,676.0	25,201.44	NC					
Sea Herring	107,823.0	40,472.74	NC					
dab (Flounder)	14,553.0	41,330.52	NC					
Ocean Perch	13,805.0	28,300.25	NC					
Haddock	7,107.0	19,473.18	NC					
Cod	11,359.0	18,628.76	NC					
Grey Sole (Flounder)	3,601.0	14,367.99	NC					
Pollack	12,855.0	14,654.70	NC					
ALL FISH (edible weight)	145,640.4[f]	410,705.93	14,162.4	39,827.5		90.3[h]	370,878.43+	
Fats & Oils								
Butter	NC		5,170.4	9,461.83				
Lard	NC		2,922.4	2,016.46				51,700.
Margarine	0.		12,926.0	5,041.14			5,041.14-	
Shortening	0.		21,243.6	19,756.55			19,756.55-	
Oils	0.		25,964.4	21,550.45			21,550.45-	135,372.[i]
Sweeteners								
Refined Sugar	0.		102,396.4	5,198.20	100.		51,198.2 -	21,333.[j]
Corn Sugar	0.		4,383.6	2,980.85	100.		2,980.85-	
Corn Syrup	0.		44,905.6	30,535.81	100.		30,535.81-	
Maple Syrup	98.27	108.2	112.4	122.52	11.7		13.69-	
Cane Molasses	0.		224.8	346.19	100.		346.19-	
Honey	170.0	204.0	1,461.2	1,753.44	88.4		1,550.04-	NA[k]
Vegetables, Fresh								
Potatoes	2,496,000.0[l]	648,960.0	56,986.8	14,702.59		97.7	634,143.43+	2,374.
Lettuce	NC		27,987.6	15,449.15				2,218.[m]
Cabbage	NC		9,104.4	2,185.06				455.
Tomatoes	NC		12,139.2	21,688.70				1,444.
Sweet Corn	NC		7,643.2	2,835.63				1,318.

Figure 7

COMMODITY	PRODUCTION		CONSUMPTION		Amount Imported (% of Consumption)	Amount Exported (% of Production)	Retail Value of Imports(-)Exports(+) ($1,000)	Land Required to Produce 100% of Consumption (Acres)
	Retail Weight (1,000 lbs.)	Retail Value ($1,000, 1980$)	Retail Weight (1,000 lbs.)	Retail Value ($1,000, 1980$)				
Snap Beans	NC		1,461.2	968.78				395.
Onions	NC		12,476.4	3,701.33				499.
Celery	NC		7,868.0	3,375.37				196.
Carrots	NC		6,631.6	2,188.42				265.
Sweet Potatoes	0.		4,496.0	1,095.90			1,095.90-	NC
Cucumbers	NC		4,383.6	1,814.81				626.
Peas	NC		NC					NC
Squash	NC		NC					NC
Peppers	NC		3,596.8	2,413.45				514.
Mushrooms	NC		3,034.8	3,611.41				
Asparagus	NC		337.2	333.83				367.
Artichokes	0.		449.6	159.61			159.61-	NC
Broccoli	NC		1,461.2	1,300.47				290.
Cauliflower	NC		1,348.8	714.86				135.
Spinach	NC		449.6	355.18				72.
Garlic	NC		1,011.6	778.93				101.
Eggplant	NC		674.4	330.46				48.
Vegetables, Frozen								
Asparagus	0.		89.9	231.94			231.94-	97.
Snap Beans	NC		1,382.5	1,258.08				434.
Lima Beans	0.		573.2	527.34			527.34-	330.
Carrots	0.		1,225.2	1,134.36			1,134.36-	97.
Peas	4,400.0	3,520.0	1,955.8	1,564.64		55.6	1,955.36+	698.
Broccoli	0.		1,539.9	1,447.51			1,447.51-	306.
Brussel Sprouts	0.		326.0	293.4			293.4 -	36.
Spinach	0.		820.5	506.71			506.71-	131.
Southern Greens	0.		1,315.1	815.36			815.36-	NC
Cauliflower	0.		562.0	533.90			533.9 -	130.
Corn	0.		1,157.7	810.39			810.39-	526.
Onions	0.		843.0	708.12			708.12-	34.
Potato Products	NC		20,344.4	12,613.53				1,620.
Vegetables, Canned								
Asparagus	0.		337.2	519.29			519.29-	366.
Lima Beans	5,250.0	3,412.5	449.6	292.24		91.4	3,119.03+	375.
Snap Beans	3,000.0	869.93	6,744.0	1,955.76	55.6		1,087.40-	2,108.
Carrots	0.		562.0	224.8			224.8 -	28.
Peas	0.		3,596.8	1,115.01			1,115.01-	1,285.
Pumpkin/Winter Squash	7,950.0	2,591.7	674.4	219.85		91.5	2,371.41+	77.
Spinach	0.		899.2	467.58			467.58-	75.
Whole Tomatoes	0.		6,519.2	2,346.91			2,346.91-	736.
Catsup, Tom. Paste	0.		16,298.0	11,897.54			11,897.54-	7,212.
Tom. Puree, Pulp	0.		899.2	404.64			404.64-	189.
Tom. & Veg. Juices	0.		3,147.2	849.74			849.74-	321.
Beets	0.		1,124.0	422.62			422.62-	62.
Corn	0.		6,182.0	2,410.98			2,410.98-	2,810.
Pickles	0.		9,666.4	6,669.82				NC
Coleslaw/Sauerkraut	960.0	447.36	1,461.2	680.92				130.
Sweet Potatoes	0.		1,236.4	952.03			952.03-	NC
ALL VEGETABLES (Excl. Potato)	49,836.0[n]	27,409.8	198,487.0	118,906.36				29,164.

Figure 7

COMMODITY	PRODUCTION		CONSUMPTION		Amount Imported (% of Consumption)	Amount Exported (% of Production)	Retail Value of Imports(-)Exports(+) ($1,000)	Land Required to Produce 100% of Consumption (Acres)
	Retail Weight (1,000 lbs.)	Retail Value ($1,000, 1980$)	Retail Weight (1,000 lbs.)	Retail Value ($1,000, 1980$)				
Fruits, Fresh								
Apples	86,000.0	26,660.0	18,658.4	5,846.30		78.3	20,875.90+	1,756.
Peaches	8.0	4.0	7,755.6	3,893.31	99.9		3,889.42-	982.
Pears	10.0	6.9	2,810.0	1,958.57	99.6		1,950.73-	407.
Strawberries	NC		2,023.2	1,493.12				405.
Blueberries	21,190.0[O]	13,773.5	146.12	94.98		99.3	13,678.52+	137.
Bananas	0.		24,053.6	6,013.40			6,013.40-	
Grapes	0.		3,484.4	3,578.48			3,578.48-	1,088.
Plums/Prunes	NC		1,910.8	458.78			458.78-	294.
Pineapples	0.		1,461.2	463.69				
Cherries	NC		674.4	709.47			709.47-	710.
Melons	NC		21,918.0	1,753.44			1,753.44-	2,739.
Oranges	0.		13,712.8	5,463.69			5,463.69-	
Tangerines	0.		1,686.0	843.0			843.0 -	
Lemons	0.		3,259.6	2,363.21			2,363.21-	
Grapefruit	0.		8,317.6	2,686.58			2,686.58-	
Other Citrus	0.		1,124.0	1,067.80				
Fruits, Processed								
Dried Fruit	0.		3,473.2	4,376.23			4,376.23-	4,668.
Frozen Fruit	0.		13,836.0	13,836.0			13,836.0 -	
Canned Juice	NC		25,694.6	9,250.06				NC
Canned Fruit	NC		31,805.6	7,850.02				NC
Grains								
Wheat Flour	0.[P]		127,012.0	21,592.04	100.		21,592.04-	63,506.
Wheat Cereal	0.		3,259.6	1,662.40	100.		1,662.40-	1,630.
Pasta Products	0.		7,980.4	3,511.38	100.		3,511.38-	3,990.
Buckwheat	4,080.0[Q]	3,468.	NC			100.	3,468.0 +	NC
Rye	0.		899.2	449.60	100.		449.60-	357.
Oats	0.		3,596.8	2,445.82	100.		2,445.82-	1,938.
Barley	0.		1,348.8	822.77	100.		822.77-	1,879.
Rice	0.		10,340.8	5,584.03	100.		5,584.03-	
Corn Meal	0.		8,654.8	3,981.21	100.		3,981.21-	4,876.
Corn Cereal	0.		2,585.2	2,947.13	100.		2,947.13-	1,429.
Hominy, Grits	0.		4,720.8	1,982.74	100.		1,982.74-	533.
Corn Starch	0.		2,135.6	1,452.21	100.		1,452.21-	NC
Legumes, Nuts								
Dry Beans	2,760.0[F]	1,821.6	7,193.6	4,747.78				
Soybeans	0.		2,248.0	899.2	61.6		2,924.63-	4,937.
Dry Peas	NC		449.6	175.34	100.		899.2 -	2,135.
Peanuts	0.		7,980.4	17,477.08				300.
Tree Nuts	0.		2,023.2	6,474.24	100.		17,477.08-	
Coconut	0.		562.0	1,405.0	100.		6,474.24-	
					100.		1,405.0 -	
Beverages								
Coffee	0.		8,542.4	26,993.98	100.		26,993.98-	
Tea	0.		786.8	4,579.18	100.		4,579.18-	
Cocoa	0.		2,922.4	11,309.69	100.		11,309.69-	
TOTALS	3,974,818.99	$1,665,332.24	2,102,937.76	$1,056,910.67			$ 690,449.12- $ 1,374,487.39+	1,877,065.

Figure 7

Retail Value of Maine Production	$1,665,332,240
Retail Value of Maine Exports	$1,374,487,390
Value of Production Remaining in Maine	$ 290,844,850 = 27.5% of Total Maine Food Consumption

Maine imports 72.5% of its food.

a Using U.S. Dept. of Agriculture, Agricultural Statistics 1980, production figures for 1979; USDA conversion figures.

b Prices supplied by Lewiston Daily Sun Foodbasket Feb. 1981; U.S. Dept. of Labor, Average Retail Prices for the Northeast.

c Using per capita consumption figures, USDA Food Consumption, Prices and Expenditures Feb. 1981 and 1980 Maine population, 1,124,000.

d For beef: William Lockeretz, Agricultural Resources consumed in Beef Production 1975; Other commodities: G. Burrill, J. Nolfi Land, Bread and History 1976.

e Cheese produced in Maine is "soft" (cottage) cheese. Per capita consumption of milk in Maine is 137 qts. (highest in U.S.).

f Fish Production: Maine Dept. of Marine Resources, Landings by commercial marine fishermen 1980, edible weight (0.6 x primary live weight). Assumes all fish for human consumption.

g Fish retail prices: supplied by Nick Alfiero of Harbor Fish (Portland, ME), averages of year 1980 prices.

h Tourists in the state of Maine consume 15% of total Maine landings (residents consume 10%) Robert Lewis, Dept. of Maine Resources. Amount exported is less than 90%.

i Acreage in soybeans required if all oil used is soy oil.

j Acreage in sugar beets at yields of 4,800 lbs. refined sugar per acre.

k To supply consumption, 42,000 bee colonies of average size (ME now has 5,000) would be required

l Total production for fresh and processed vegetables, excludes produce of home gardens. Maine Dept. of Agriculture figures used when available.

m Greenhouse acreage for lettuce consumption is 874,612.5 sq. feet at 4 harvests per year, 8 lbs./sq. ft.

n Estimate based on total acreage in vegetables (fresh and processing excluding potato) in 1978: 11,587 acres.

o Over 90% of blueberry crop is processed into frozen blueberries, Anr Isnal Univ. of Maine at Orono.

p Maine had 44,000 acres corn for silage; 7,000 acres corn for grain; 1,500 acres wheat, 42,000 acres oats, 214,000 acres hay for livestock feed (1980).

q Buckwheat produced in 1980 was exported to NY state for human consumption.

r Estimate derived from information by Herbert York, Maine Bean Grower's Association.

NC: Figures not collected for these commodities. Production is very small or none.
NA: Not Applicable,

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